Claims

1. A method for processing in a communications system a data packet stream carrying real-time data traffic, with the steps of
   - receiving a first synchronisation control packet (SCP) that includes a number of p synchronisation control parameters, with p = 1, 2, 3, ...,
   - reading at least one synchronisation control parameter from the synchronisation control packet (SCP),
   - receiving at least one payload data packet,
   - determining for each payload data packet a delivery deadline, and
   - sorting the at least one payload data packet according to its determined delivery deadline into a first queue (EDF) and setting a time stamp in the first queue (EDF) to the determined delivery deadline.

2. The method according to claim 1, wherein the step of reading at least one synchronisation control parameter comprises the reading of
   - a number of packets (N) in a synchronisation entity,
   - a maximum transmission time (I),
   - a byte-size (S) for each payload packet,

   and wherein the determination of the delivery deadline for each payload data packet comprises the steps of
   - determining a packet error rate (Pj) of a channel (j) used for transmitting the synchronisation entity,
   - determining a bit rate (Rj) of said channel (j),
   - determining a time value (t) indicating a current arrival time of payload data packets, and
   – calculating the delivery deadline therefrom.

3. The method according to claim 2, wherein the delivery deadline for a current payload data packet i is calculated as follows:

$$deadline_i = t + I - \frac{(N - i + 1) \cdot S}{N \cdot (1 - Pj) \cdot Rj}, \qquad i \in \{1..N\}.$$

4. The method according to claim 1, 2 or 3 with the additional steps of
– receiving a first admission control packet (ACP) that includes a number of q admission control parameters, with q = 1, 2, 3, ...,
- reading from said first admission control packet (ACP) at least one admission control parameter indicating a throughput (Rl) required for a real-time processing of a sub-stream of data packets, which is received after the first admission control packet and before a second admission control packet,
- determining a currently available throughput (V),
- comparing the available throughput (V) with the required throughput (Rl),
- admitting the real-time processing of the sub-stream, if the available throughput (V) is higher than or equal to the required throughput (Rl), and sending said sub-stream to a packet scheduler.

5. The method according to claim 4, wherein
- the step of reading the at least one admission control parameter comprises the reading of a maximum throughput (Rh),
with the additional step of
- choosing for a sub-stream a throughput between the mimimum required throughput (Rl) and a minimum of the maximum throughput (Rh) and the available throughput (V).

6. The method according to claim 4 or 5, with the additional step of
- rejecting the real-time processing of the sub-stream, if said sub-stream is not

admitted for real-time processing, and sending said sub-stream to the packet scheduler.

7. The method according to claim 6, with the additional step in the case of rejection of the sub-stream for real-time processing, of
– sorting at the packet scheduler the data packets in their order of appearance into a second queue (FIFO).

8. The method according to claim 7, with the additional steps of
– further processing the data packets from the first queue (EDF) according to their delivery deadlines, and
–further processing the data packets from the second queue according to a first in – first out strategy.

9. The method according to claim 6, 7 or 8, with the additional step of
– prioritising by an output interface for the further processing data packets contained in the first queue (EDF) and data packets contained in the second queue (FIFO).

10. The method according to any of the claims 4 to 9, with the additional step of
– generating and returning from an admission controller (AC) along the sub-stream's transmission path a modified admission control packet comprising throughput capability parameters of said admission controller (AC).

11. The method according to any of the claims 1 to 10, with the further step of
– receiving the synchronisation control parameters from a header of an underlying network protocol.

12. The method according to any of the claims 1 to 11, with the further step of
– detecting a deadline violation by repeatedly comparing for payload packets sorted into the first queue (EDF) their actual time spent in said first queue with their deadlines according to their time stamps.

13. The method according claim 12, with the further step of
– performing after detecting the deadline violation an adaptation of at least one payload data packet of the first queue (EDF).

14. The method according to any of the claims 1 to 13, with the further step of
– receiving the admission control parameters from a header of an underlying network protocol.

15. A network node in a communications system for processing real-time data packet traffic, comprising
- a packet error rate determining unit to determine a packet error rate (Pj) of a communications channel (j) ,
- a bit rate determining unit to determine a bit rate (Rj) of said communications channel (j),
- a timer to determine for at least one data packet that is received at the network node a current time value (t),
- an evaluation means to evaluate control parameters given by at least one control packet (ACP, SCP) embedded in a traffic flow,
- a calculator unit for calculations of deadlines for data packets, and
- a first queue (EDF) for data packets.

16. The network node according to claim 15, wherein the first queue (EDF) includes a sorting unit to sort data packets according to their deadlines into the first queue (EDF), said sorting unit following an earliest deadline first strategy, and wherein

said sorting unit sets time stamps of the first queue (EDF) according to calculated deadlines.

17. The network node according to claim 15 or 16, comprising in addition
- a determining unit to determine a currently available throughput (V) of the network node, and
- a decision means to decide, whether an incoming data packet traffic flow can be processed at the network node according to real-time requirements given by admission control parameters.

18. The network node according to any of the claims 15 to 17, further comprising
- a second queue (FIFO) for data packets that are not admitted for real-time processing,
- a transfer unit to forward a data packet traffic flow after a positive decision by the decision means to the first queue (EDF) or after a negative decision to the second queue (FIFO), and
- an output interface (OI) that prioritises all queues and that reads out data packets from all queues.

19. The network node according to any of the claims 15 to 18, further comprising
- a deadline violation handler for monitoring of deadlines of data packets, for a detection of at least one deadline violation, and for an initiation of an adaptation of at least one data packet, and
– an adaptation unit for the adaptation of at least one data packet.

20. The network node according to any of the claims 15 to 19, further including a radio base station for receiving and transmitting of said real-time data packet traffic.

21. A computer program,
loadable into a memory of a digital computer,
comprising software code portions for performing the steps of
- detecting in a data packet stream, which carries real-time data traffic, and which is received at a packet scheduler, at least one synchronisation control packet (SCP), which is followed by a synchronisation entity that comprises at least one payload data packet, said synchronisation control packet comprising synchronisation control parameters,
- reading from the synchronisation control packet a number of packets in the synchronisation entity (N), a maximum transmission time (I) allowed for a real-time transmission of the synchronisation entity and a byte-size (S) of the synchronisation entity,
- determining a packet error rate (Pj) of a channel (j) that is used for transmitting said sub-stream,
- determining a bit rate (Rj) of said channel,
- determining a time value (t) indicating a current arrival time of payload data packets, and,
- calculating for each payload data packet a delivery deadline therefrom,
– sorting each payload packet according to its deadline into a time stamp based first queue (EDF), and setting a time stamp of the first queue to the calculated deadline,
when said computer program is executed on a computer.

22. The computer program according to claim 21, wherein the delivery deadline for a current payload data packet (i) is calculated as follows:

$$deadline_i = t + I - \frac{(N - i + 1) \cdot S}{N \cdot (1 - Pj) \cdot Rj}, \qquad i \in \{1..N\}.$$

23. The computer program according to claim 21 or 22, further comprising software code portions for performing the steps of
– detecting in the data packet stream, which carries real-time data traffic, and which is received at an admission controller (AC), a first admission control packet (ACP) comprising admission control parameters,
- reading at least two admission control parameters (Rl, Rh) from said first admission control packet,
- calculating a throughput (V) as a difference of a total throughput (Vmax) available at said admission controller (AC) and a currently occupied throughput (Vc),
- comparing the throughput (V) with the required throughput (Rl), and
- if the available throughput (V) is lower than the lowest required throughput (Rl) then rejecting a real time processing of a sub-stream of data packets that follows between said first admission control packet and a second admission control packet, or else choosing a throughput value from a range of throughput values, said range including as limits the lowest required throughput (Rl) and a second throughput value (Rh, M) and admitting a real-time processing of said sub-stream.

24. The computer program according to claim 23, further comprising software code portions for performing the steps of
– generating and sending back from the admission controller (AC) along the sub-stream's transmission path a modified admission control packet comprising throughput capability parameters of said admission controller (AC).

25. The computer program according to any of the claims 23 to 24, further comprising software code portions for performing the step of
– sorting the data packets of a sub-stream that is rejected for real-time processing in their order of appearance into a second queue (FIFO).

26. The computer program according to claim 23, 24 or 25, further comprising software code portions for performing the step of
– prioritising for reading-out data packets contained in the first queue (EDF) and data packets contained in the second queue (FIFO).

27. The computer program according to any of the claims 21 to 26, further comprising software code portions for performing the step of
– detecting a delivery deadline violation by repeatedly comparing for data packets sorted into the first queue (EDF) an actual time value with their deadlines according to their time stamps.

28. The computer program according to claim 27, further comprising software code portions for performing the steps of
– performing after detecting the delay violation an adaptation of at least one data packet of the first queue (EDF).

29. The computer program according to any of the claims 23 to 28, further comprising software code portions for performing the step of
– reading the admission control parameters from a header of an underlying network protocol.

30. The computer program according to any of the claims 21 to 29, further comprising software code portions for performing the step of
– reading the synchronisation control parameters from a header of an underlying network protocol.